TLC Visualizer
The Documentation and Evaluation System with High-Resolution 12 bit CCD Camera

Professional Visualization, Documentation and Evaluation of Planar Chromatograms
Visualization, evaluation, and archiving

The visual impression of a TLC plate showing all samples and standards side-by-side is one of the most convincing arguments for Thin-Layer Chromatography. To reproducibly capture and digitally preserve that impression using various illumination modes is the essential purpose of a state-of-the-art documentation system. TLC Visualizer meets all challenges of image acquisition and sets new standards for sophisticated image based evaluation of planar chromatograms.

Key features of the TLC Visualizer Documentation and Evaluation System:

- The new design of the illumination unit significantly improves the homogeneity of the captured image under white light, transmitted white light, UV 254, UV 366.
- The powerful high-resolution 12 bit CCD camera with excellent color fidelity allows fast image transfer at rates below 1 s. Fixed capture parameters such as focal length, focus, and aperture ensure high reproducibility of images from plate to plate.
- Easy and intuitive handling with “winCATS – Planar Chromatography Manager”. Automatic image optimization for all illumination modes and a spot amplification tool are included in the basic version.
- “Professional Image Enhancement” provides perfect illumination. Advanced plate background correction eliminates all plate inhomogeneities. The results are images of superb quality.
- Monitoring of long-term behaviour of samples/plates by capturing a series of images over a defined period of time is integrated in “Professional Image Enhancement”.
- The “Image Comparison Viewer” allows comparing tracks from different TLC/HPTLC plates directly with each other on the same screen.
- Quantitative evaluation of digitized images with software “VideoScan”.
- TLC Visualizer and winCATS software are compliant with GMP/GLP; IQ/OQ qualification and 21CFR11 are provided.

▲ Comparison of rhubarb samples, from top: UV 254 nm, UV 366 nm, white light after derivatization with phosphomolybdic acid.
The Digital Camera:
The new CCD camera combines the spatial resolution of about 0.1 mm with exceptional color fidelity, a linear 12 bit digitalization (4095 levels per color channel) and a low noise electronics circuitry. The high dynamic range makes it possible to detect, e.g. impurities at ppm range.

This is an important feature in TLC image documentation because it makes a significant difference if digitalization allows linear steps of 0.025% (this camera) or non-linear steps of approx. 1% only (8 bit consumer camera).

Of great importance is the exceptional reproducibility of the image thanks to the extremely good control of exposure times.

Further important features:
- Automatic optimization of exposure time in steps of 230 μs up to 10 s.
- Optimization of exposure time and correction of illumination

The illumination unit:
- 254 nm, short-wave UV – direct light
- 366 nm, long-wave UV – direct light
- White light – direct light and/or transmitted light

Remark: The UV 366 tube is a broad band UV source and equally qualified for UV 365 specifications.
- Tubes operate at high-frequency current to ensure best light efficiency and to eliminate synchronization problems with the digital camera.
- Complete exclusion of ambient light
- Automatic shut off for all UV illuminations protects the user from UV radiation.
winCATS is a modern integrated software for control of TLC instruments. It combines information about and data of the individual steps of instrumental Thin-Layer Chromatography as modules in a data file. TLC Visualizer is a module for the “Documentation” step. Aside of image acquisition also functions for annotation, determination of position (R_f), display with contrast amplification, and image export are included. For compliance with cGMP/GLP and 21 CFR Part 11, none of these functions alters raw data.

Highest reproducibility of the image acquisition process are ensured by the following features:

• A fix-focus lens guarantees reproducible, sharp images.
• A zoom function is omitted so that images of the same plate format always have the same size.
• The aperture is fixed to allow optimal functionality of the flatfield correction.
• The exposure time is calculated automatically by winCATS to an accuracy of 230 μs so that the brightest zone of the image is at the optimum level of the available dynamic range of the CCD.
• The image area, in which the automatic exposure optimization is employed, can be specified by the user.

What does that mean for routine work?
You position the HPTLC/TLC plate in the TLC Visualizer, switch on the desired illumination mode and obtain within a few seconds an optimal image automatically sized to the exact dimension of the plate. Subsequent chromatograms of different samples obtained with the same procedure can be documented with the same optimized capture setting.

The documentation step of winCATS fits the typical use of TLC Visualizer in the TLC process. Images are arranged accordingly, for example with the label “Developed”, “Derivatized” and the appropriate illumination mode (UV254/UV366/VIS).
winCATS option for TLC Visualizer “Professional Image Enhancement” offers further possibilities for optimization:

- For optimal flatfield correction the individual properties of the instrument at hand (digital camera, lens, and illumination unit) are measured on site as part of OQ for each light type. Thus the illumination error is typically reduced to less than 5%.

- During system qualification a sophisticated check of focus, positioning and white balance ensures overall peak performance of the system.

- Color profiles of image acquisition and display are corrected for a most realistic color reproduction (sRGB color space)

- With “clean plate correction” an image taken of a neat plate (prior to sample application) can be subtracted from the image of the developed and derivatized plate. Thus irregularities of the HPTLC plate, particularly the structure of the fluorescence indicator, or small variations in layer thickness seen in transmission mode, are efficiently eliminated.

- Multiple images can be accumulated to improve the signal to noise ratio. This process can significantly lower the detection limits.

- Additional tools such as automatic capturing of sequences over a determined period of time and “field average intensity information” for precise intensity comparison/measurements are integrated.

Example for white light:

No Correction – Standard Correction – Individual Correction with Professional Image Enhancement

Example for “Clean Plate Correction”:
The corrected image (right) is of superior quality. Due to reduced noise weaker zones become detectable.
The winCATS option for TLC Visualizer “Image Comparison Viewer” allows comparing tracks from different TLC/HPTLC plates directly with each other on the same screen:

- Simultaneous display of tracks from (groups of) samples or easy side by side comparison of reference tracks from different plates
- Automatic transfer of track information such as position, width, length, ID data to the viewer differentiating between reference and sample tracks
- Reporting of the generated comparison as well as additional information
- Storage of data in individual archives for appropriate batch, lot number, etc.
- Trace-back of all generated data to the original analyses.

**Image Comparison Viewer**: Selected tracks of images taken of the same plate under UV 254 nm (20, 25), white light (35, 40) and UV 366 nm (all other tracks) are compared.
The VideoScan software permits the quantitative evaluation of digitized images captured and archived with the TLC Visualizer system.

- Conversion images of TLC/HPTLC chromatograms into analogue curves based on absorption or fluorescence of separated zones.
- Integration of chromatograms resulting in quantitative peak data (area and/or height)
- Quantitative analysis of samples in comparison to calibration standards on the same plate
- Stand-alone Windows software

Profile comparison
- Display of individual chromatograms
- Position of peaks ($R_f$-value/migration distance) can be determined
- Comparison of chromatograms from the same or different plate/image

Quantitative evaluation
- Intuitive data management
- Several calibration modes (e.g. single level, multi level, related substances)
- Re-evaluation of data at any time
- Image document secured against any type of manipulation, as required for cGMP compliance.
- Reports generated cGMP compliant
## Ordering information

022.9780 **CAMAG TLC Visualizer Documentation & Evaluation System** consisting of illumination unit with visible/white light, UV254, UV366, visible/white light transmitted and professional 12 bit digital camera with 12 mm lens. Suited for **object formats up to about 21×28 cm (20 × 20 cm TLC plates)**.

022.9781 **CAMAG TLC Visualizer Documentation & Evaluation System** same as in 022.9780 but professional 12 bit digital camera with 16 mm lens. Suited for **object formats up to about 16 × 21 cm (20 ×10 and 10 ×10 cm TLC/HPTLC plates)**.

027.6300 **Software winCATS** “Planar Chromatography Manager” License including one year of Internet Update-Service.

### Options:

027.6372 **winCATS Option “Professional Image Enhancement”** includes extended IQ/OQ with individual camera positioning/focusing performance check, white adjust and flat field correction for all illumination modes. Clean plate correction, camera color matrix correction and image averaging (up to 64 images) for unsurpassed image quality. Image sequence over time and signal intensity meter for basic intensity measurements.

027.6373 **winCATS Option “Image Comparison Viewer”** to compare image tracks of samples, groups of samples either situated on the same or on different TLC/HPTLC plates directly with each other side by side. Automatic cropping of image tracks in winCATS and export to the image comparison viewer. Includes basic reporting and storage of performed image comparisons.

022.9579 **VideoScan Chromatogram Evaluation Software** for quantitative evaluation of images captured with TLC Visualizer.

### Technical Data

**TLC Visualizer** W x D x H: 480 × 537 × 710 mm; weight: 17 kg  
Power connections: 100–240 V; 50/60 Hz; 50 W  
Camera connection: IEEE1394a (FireWire)

For efficient work with winCATS we recommend: PC with Pentium 2 GHz or faster, installation drive CD ROM, printer and IEEE1394a FireWire port, operating system Windows XP/SP2, at least 1 GByte RAM, graphics card with True Color 32bit and screen resolution 1280 ×1024 pixels.

### Training, Service, Support

Training courses, also in combination with TLC specific courses, are offered at the CAMAG locations in Switzerland, Germany, USA, Indian and China. More information at [info@camag.com](mailto:info@camag.com)